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ABSTRACT

An instructor's manual and student activity guide on forestry are provided in this set of prevocational education materials which focuses on the vocational area of agriculture. (This set of materials is one of ninety-two prevocational education sets arranged around a cluster of seven vocational offerings: agriculture, home economics, distributive education, health occupations, world of work, trade and industry, and office occupations.) The instructor's guide includes the following elements: title of activity, duration of activity (five to nine periods), activity goals, ten instructional objectives for two occupational areas (forester aide and forest supervisor), related vocational clusters, and activity implementation (description, materials needed, safety considerations, teacher preparation prior to class, during the class, follow-up activities, and masters for duplication). The student activity guide provides step-by-step instructions (narrative and illustrations) for completing each instructional objective (e.g., use a cruise stick to determine tree height, supervise as other students estimate tree diameters). At the end of each set of instructions is a student check point (evaluation activity). Nine occupational descriptions (e.g., fire ranger, forest nursery supervisor, forester aide) conclude the document. (JH)

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AGRICULTURE – FORESTRY

Kit No. 31

INSTRUCTOR'S MANUAL

Prepared by

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Office of Vocational Education
Prevocational Education
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In Cooperation With

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1978

CE 020 505

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TITLE OF ACTIVITY

Kit No. 31, Agriculture – Forestry

DURATION

Main Activity – 4 to 5 class periods
Follow-up Activity – 1 to 4 class periods

GOALS

The purpose of this activity is to introduce the students to some of the activities forestry workers must do. The basic skills explored are estimating diameters at breast height and estimating tree height. Other related occupations are also explored.

Forester Aide: The student will develop a better understanding of the use of some forestry tools and activities performed by forester aides.

Forest Supervisor: The student will develop a better understanding of the activities of a forest supervisor and the use of some forestry tools.

INSTRUCTIONAL OBJECTIVES

Individual Activity Objectives are as follows:

Forester Aides:

- Objective I: The student will cut out a Biltmore or cruise stick from the ½" x 6" (1.27 x 15.24 cm) board.
- Objective II: The student will label the cruise stick.
- Objective III: The student will engrave the marks on the stick.
- Objective IV: The student will use the new cruise stick to estimate the diameters of the preselected trees.
- Objective V: The student will use the new cruise stick to determine tree height.

Forest Supervisor:

- Objective I: Given the teacher's instructions to take charge, the student will check to see that each student has a programmed text.
- Objective II: The student will supervise the making of the cruise sticks.
- Objective III: The student will supervise the forester aides as they estimate tree diameters.
- Objective IV: The student will supervise the forester aides as they learn to pace.
- Objective V: The student will supervise and check the forester aides as they estimate tree height.

VOCATIONAL CLUSTERS

Agriculture
Trade and Industrial Occupations
World of Work

ACTIVITY IMPLEMENTATION

A. Activity Description

The class makes Biltmore or cruise sticks to estimate tree diameters and tree heights. A designated forest supervisor controls the entire operation from cutting and labeling the cruise sticks to estimating diameters and heights. The forester aides learn to make the cruise sticks, how to pace, and how to estimate tree diameters and tree heights.

B. Safety

Always notify the instructor immediately when you are injured in the shop, no matter how slight the injury.

Safety goggles of an approved type should be worn at all times in the shop when operating equipment.

Place all combustible materials in the proper containers.

Keep aisles, walkways, and work areas free of excess materials.

Return all tools to proper storage after use.

Operate machines only when authorized.

Avoid needless shouting, whistling, or horseplay in the shop.

Do not disturb anyone who is operating a machine.

Always follow directions.

C. Materials Required

1. Audio Visual Equipment
   None

2. Technical Equipment
   2 crosscut handsaws
   2 electric engravers
   4 combination squares
   6 safety goggles
   4 six-foot (1.83 m) folding rulers
   1 level (Abney)
   2 Biltmore sticks (cruises)
   1 100-ft. (30.48 m) steel tape
   2 tree diameter tapes

3. Expendable Supplies
   Pencils
   Paper
   Masking tape
   Thumb tacks
   Sandpaper
   ½" x 6" x 10' (1.27 x 15.24 cm x 3.05 m) boards

D. Preparation Prior to Class

Obtain all of the necessary materials.

Select the number of Student Learning Activity Guides needed for your class. Class size may vary from just a few members to 30 or more. A forest supervisor should be appointed for each group of ten students.

Forest Supervisor – 1 2 3
Forest Aides – 10 20 30

Set up the following areas:

Construction: space with tables for measuring and electrical outlets for the saw and engraver.

Pacing area: football field, parking lot, hallway. Yards can be marked with tape, chalk, etc.

Forest: select an area near the school with 5 - 20 trees from medium to large size, preferably pines. If no trees are available, use light poles.

E. During Class Session

INTRODUCTION – This activity represents some of the activities of the forestry industry. This is a very basic project and the skills introduced are fundamental to forestry. Activities related to other occupational fields are also explored.

The activity is based on the construction of a Biltmore or cruise stick for estimating tree diameters and heights. It will take one or two class periods to make and label the cruise sticks and two to four days to learn to pace and estimate tree diameters and heights.

The teacher will provide the materials, equipment, establish the work areas, appoint the forest supervisor(s), and serve as an advisor for the activity. The forest supervisor will be in charge of all individual activities, reporting to the teacher regarding the progress of the activity and for assistance with major problems.

The following materials are needed to perform this activity:

Student Learning Activity Guides
Technical equipment and expendable supplies as listed

The Biltmore sticks can be taken home by the students after the activity has been completed. Some students may wish to measure timber at home.

2. Appoint the forest supervisor(s).
3. Have the other students select a programmed text.
4. Explain the flow chart and how the activity will progress.
5. Carefully explain that the forest supervisor will have control of the activity and that the teacher's role will be that of an advisor.
6. Oversee the activity and give advice and assistance only when necessary.

F. Follow-up Activities

1. Select at least one of the follow-up activities. It is recommended that the first follow-up activity be used if the others are not. These activities should be assigned for the next class meeting following completion of the activity.
2. The follow-up activities are as follows:
   A. Individual Activity

   Using the "VIEW" series, the student will answer a series of questions on a fact sheet of an occupation related to the forestry industry. It is recommended that the student keep a notebook with sections 1 through 5. The student then can place the "VIEW" fact sheet in the appropriate section according to how they rated their

interest in the occupation selected.

B. Group Activity

Arrange for a class trip to a local sawmill or forest industry.

C. Group Activity

Arrange for a local forester or forest ranger to visit the class to explain the activities engaged in and opportunities in the field.

D. Group Activity

The students may want to contact a sawmill to determine the price of timber. Then they could figure the selling price of the timber measured.

E. Group Activity

Some of the students may wish to set out tree seedlings as another project. The seedlings could be obtained through the local forest ranger.

MASTERS FOR DUPLICATION

VIEW Fact Sheet

VIEW FACT SHEET

NAME _____ CLASS _____ OCCUPATION _____

A. List the advantages (good points) of this occupation (job).

B. List the disadvantages (bad points) of this occupation (job).

C. List three things you should know to do this occupation (job).
1.
2.
3.

D. What type of education should you get to be prepared (do) for this occupation (job)?

E. What courses must you take to go into this occupation (job)?

F. What do you think your future in this occupation (job) will be?

G. What wage can you expect in this occupation (job)?

H. What are the working hours of this occupation (job)?

I. To learn more about this occupation (job), write to:

J. Using a scale of 1 to 5, circle the number that measures your interest in this occupation (job) as a possible career.

I don't like it. ← 1 2 3 4 5 → I like it.

AGRICULTURE – FORESTRY

Kit No. 31

STUDENT
LEARNING ACTIVITY GUIDE

Prepared by

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INTRODUCTION

This activity represents some of the activities of the forest industry. This is a very basic project and the skills introduced are fundamental to forestry. Activities related to other occupational fields are also explored.

The activity is based on the construction of a Biltmore or cruise stick for estimating diameters and heights of trees. It will take one or two class periods to make and label the cruise sticks and two to four days to learn to pace and estimate tree diameters and heights.

The teacher will provide the materials and equipment, establish the work areas, appoint the forest supervisor(s), and serve as an advisor for the activity. The forest supervisor(s) will be in charge of all individual activities. Report to the teacher regarding the progress of the activity and ask for assistance with major problems.

The following materials are needed to perform this activity:

Student Learning Activity Guide
Technical equipment and
expendable supplies as listed

The Biltmore sticks can be taken home by the students after the activity has been completed. Some students may wish to measure timber at home.

DIRECTIONS

After the teacher has selected a forest supervisor to oversee the activity and has explained the activity to the class, each student will choose a programmed text and read it carefully. The teacher will explain materials and answer questions. The forest supervisor will take charge. Each student will report to the work area indicated in the programmed text and begin work when the forest supervisor gives the go-ahead.

INTRODUCTION

The forest supervisor helps the forester aides in making Biltmore or cruise sticks and supervises the use of the sticks in measuring diameters and heights of the trees.

GOAL

The student will develop a better understanding of the activities of a forest supervisor and the use of forestry tools.

DIRECTIONS

Follow the directions very carefully. Complete each step before continuing to the next step. If a problem arises, ask the teacher for help.

MATERIALS

Abney level
100-ft. steel tape (30.48 m)
Thumb tacks
Paper
Pencil
Chalk
Masking tape
Tree-diameter tape

PROGRAMMED TEXT

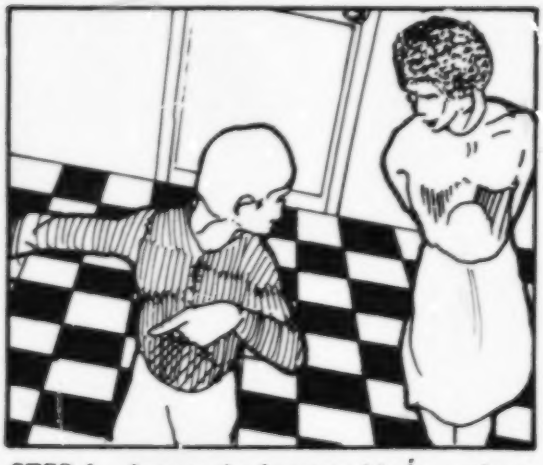
Instructional Objective 1

Given the teacher's instructions to take charge, the student will check to see that each student has a programmed text.

STEP 1 – The forest supervisor will take charge of the activity.

STEP 2 – Instruct each student to select a programmed text.

STEP 3 – Instruct the forester aides to read the programmed texts.



STEP 4 – Answer the forester aides' questions. The forest supervisor may seek the help of the teacher.

Check Point

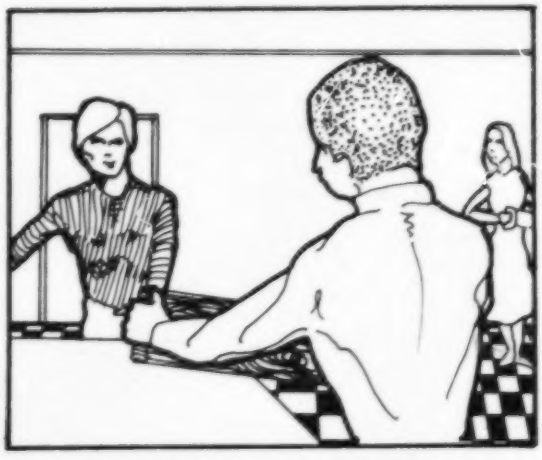
Before continuing to the next step, get the teacher's approval.

If the teacher gives the go-ahead, continue to the next objective.

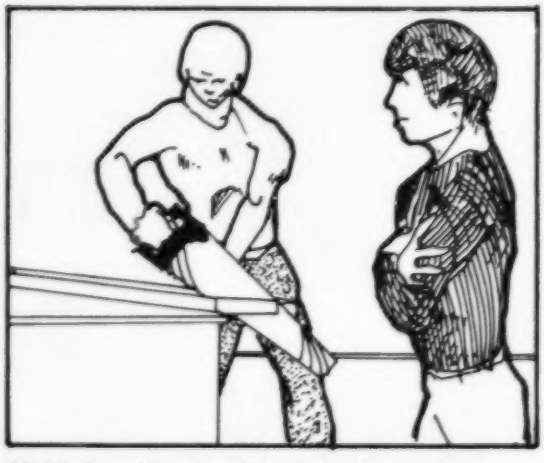
If the teacher does not give the go-ahead, re-do the steps in Instructional Objective I.

Instructional Objective II

The student will supervise the making of the cruise sticks.

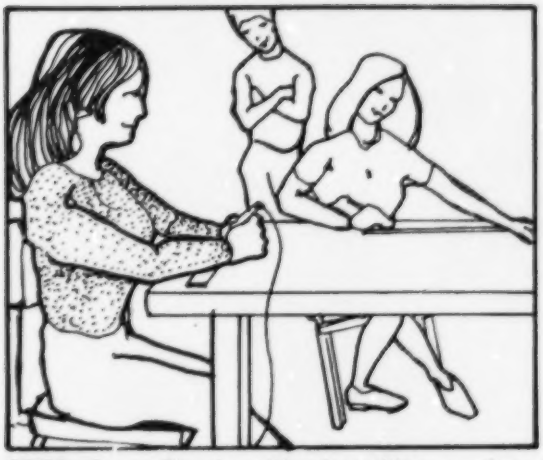


STEP 1 – Check with the aides as they measure their sticks to be cut.

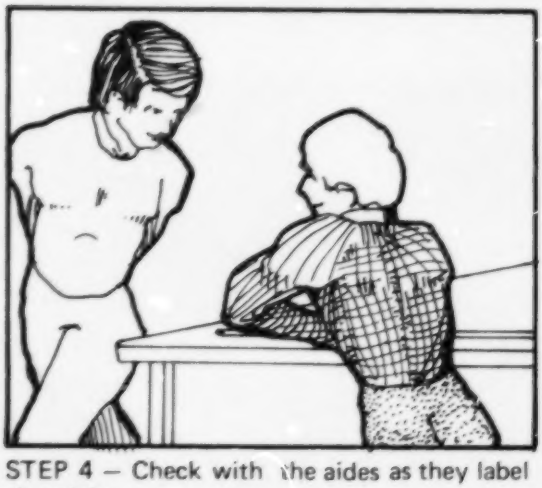


STEP 2 – Check with the aides as they cut out the stick with the handsaw.

STEP 3 – Check each stick to see that it measures 1¼ inch wide (3.175 cm) and 25 inches long (63.5 cm).

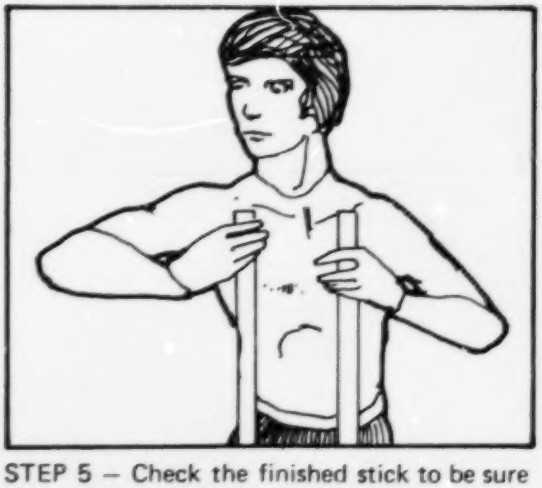


STEP 6 – Check with the aides as they engrave the cruise sticks.

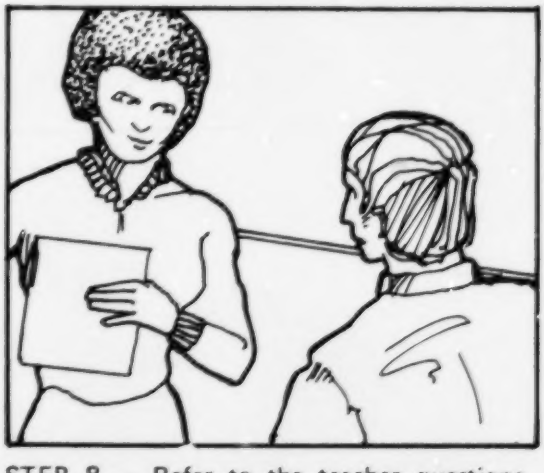


STEP 4 – Check with the aides as they label the sticks.

STEP 7 – Check the sticks after they are engraved.



STEP 5 – Check the finished stick to be sure that it is the same as the model stick.



STEP 8 – Refer to the teacher questions you cannot answer.

Check Point

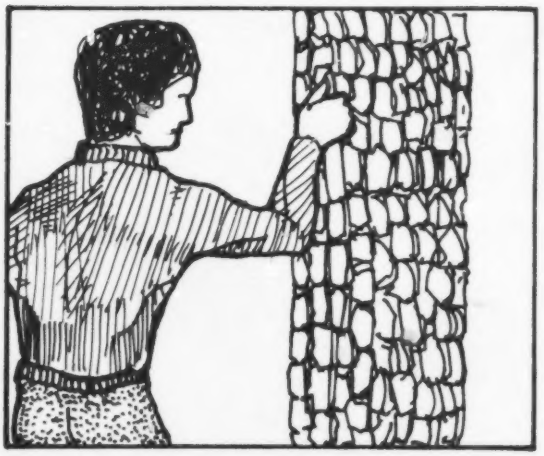
Check with the teacher for his/her approval before continuing to the next step.

If the work is approved, continue to the next objective.

If the work is not approved, re-do the steps in Instructional Objective II.

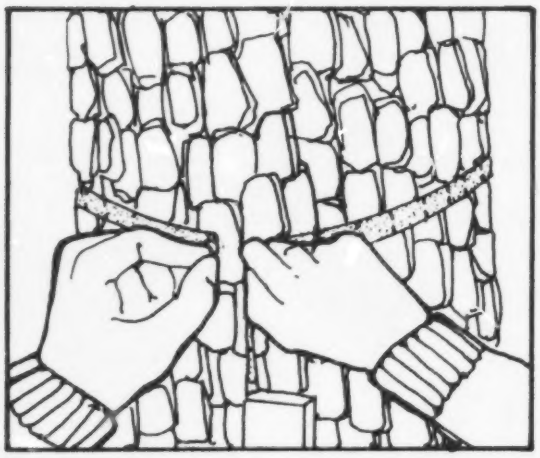
Instructional Objective III

The forest supervisor will oversee the forester aides as they estimate tree diameters.



STEP 1 – Number the trees that were selected by the teacher with the paper and thumb tacks.

STEP 2 – Assist the forester aides as they estimate diameters.



STEP 3 – Measure the circumference (distance around the tree) of each tree at breast height, using the steel tape for tree diameters.

STEP 4 – Record the diameter of each tree beside the tree number as read from the tree diameter tape.

STEP 5 – Check the forester aides' estimated diameters.

Check Point

Before continuing to the next objective, check with the teacher for approval.

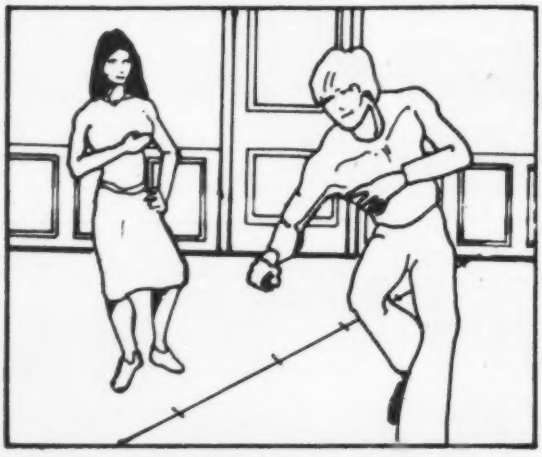
If the teacher gives the go-ahead, continue to the next Instructional Objective.

If the teacher does not give the go-ahead, re-do the steps in Instructional Objective III.

Instructional Objective IV

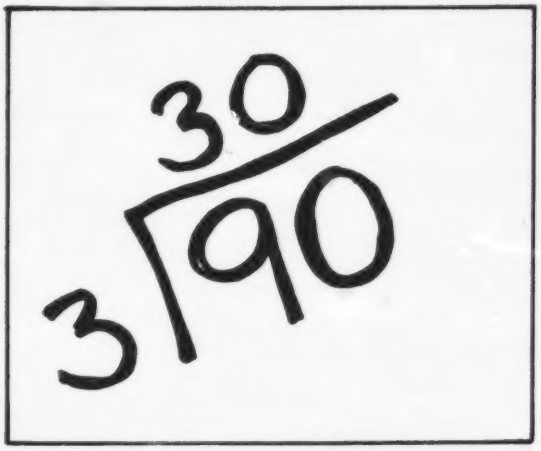
The forest supervisor will oversee the forester aides as they learn to pace.

STEP 1 – Using the steel tape, measure 90 feet (27.43 m) on a site selected by the teacher.



STEP 2 – Mark the distance every three feet (.914 m) with some type of marker (chalk on asphalt, masking tape on a hall floor, markers on a football field, etc.).

STEP 3 – Supervise the forester aides as they practice pacing the distance.



STEP 4 – Make sure the forester aides step 1 yard (.914 m) each step or 30 steps for the measured distance.

Check Point

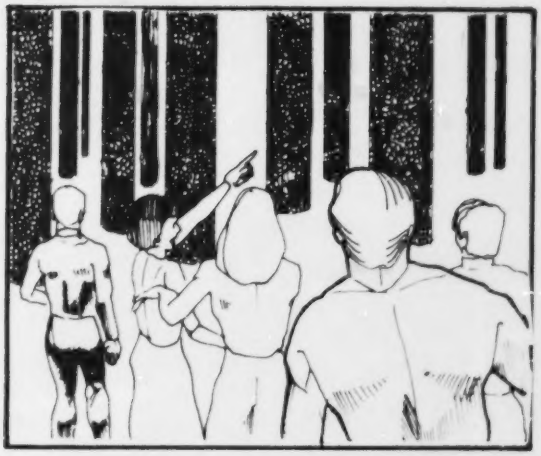
Before continuing to the next step, check to see that all the forester aides can pace the 90 feet (27.43 m) in thirty steps.

If all students pace properly, continue to the next step.

If some of the forester aides do not pace properly, go back and follow directions.

Instructional Objective V

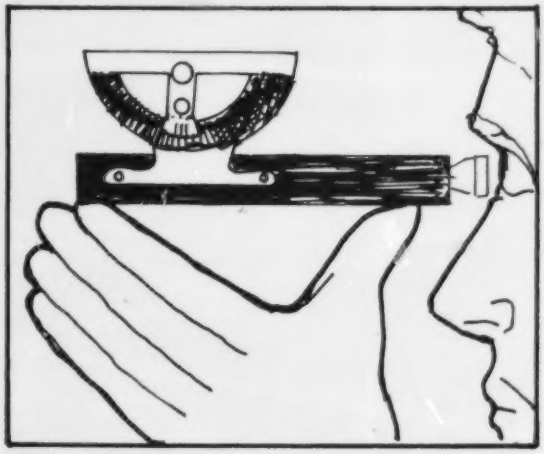
The forest supervisor will check the forester aides' estimated tree heights.



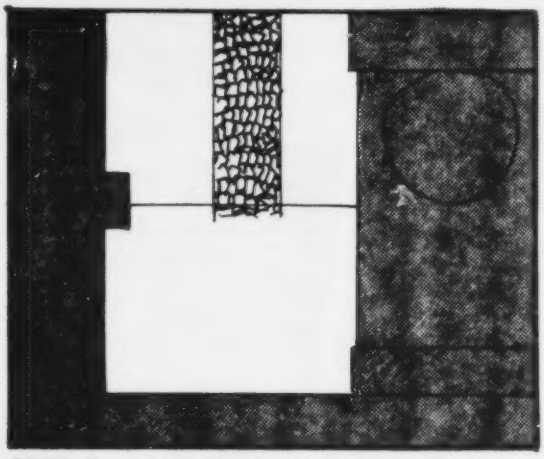
STEP 1 – Go to the tree site with the forester aides.

STEP 2 – Supervise the students as they estimate tree heights.

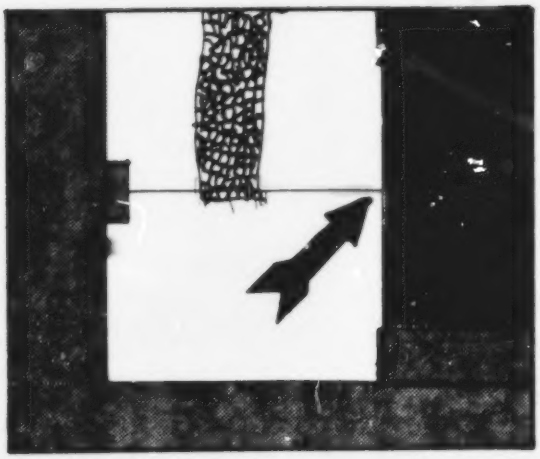
STEP 3 – Using the 100-ft. (30.48 m) tape, measure 66 feet (20.12 m) from the the base of each tree, trying to stay on the *same level* as the tree base.



STEP 4 – Using the Abney level and standing 66 feet (20.12 m) from the base of the tree, sight through the level scope at the base of the tree.



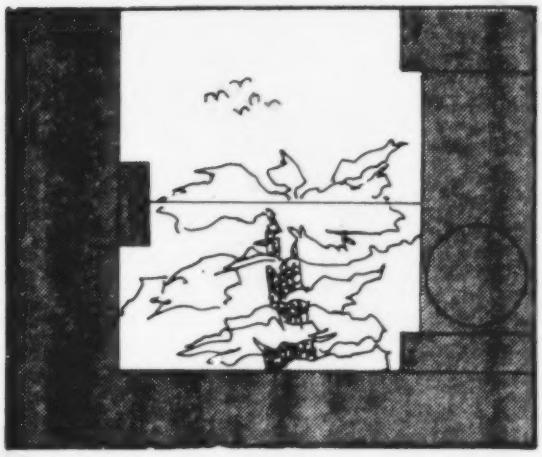
STEP 5 – Line the horizontal cross-hair up with the tree base.



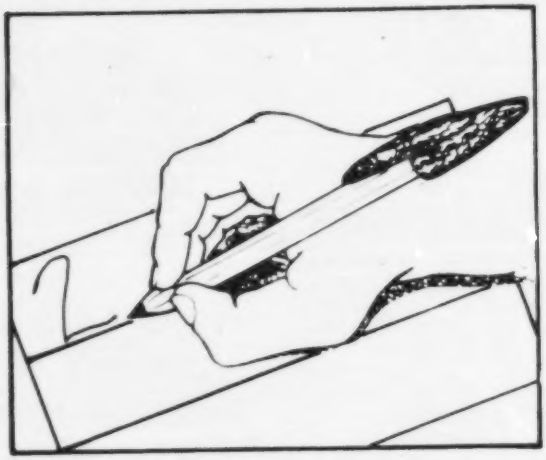
STEP 6 – While keeping the cross-hair on the tree's base, move the scale on the side until you see the bubble line up on the cross-hair.

STEP 9 – Sight through the level at the tree top.

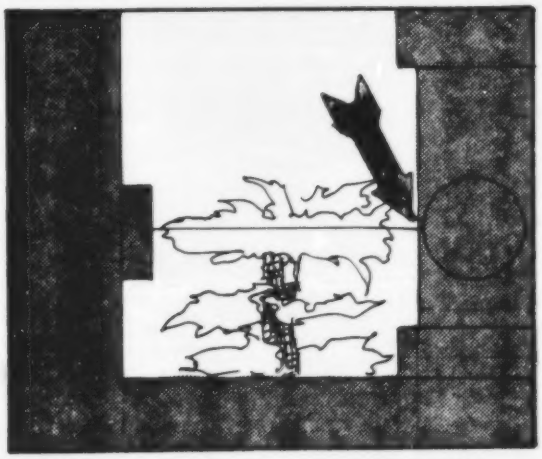
STEP 7 – Put the Abney level down and read the number off the scale in degrees.



STEP 10 – Line the cross-hair up with the top of the tree's trunk.



STEP 8 – Write the number down.



STEP 11 – Keeping the cross-hair on the top of the tree's trunk, move the scale so that the bubble lines up on the cross-hair.

STEP 12 – Put the level down and read the number from the scale.

STEP 13 – Add the two numbers together to get the tree's height.

STEP 14 – Repeat for each of the preselected trees.

STEP 15 – Check the forester aides's estimated heights against the heights determined by the Abney level.

Check Point

Check with the teacher for approval.

If teacher does not approve the heights, repeat Instructional Objective V.

INTRODUCTION

Using the sticks, the forester aide will estimate the saw logs available in 10-20 preselected trees. (The forester aide works under the supervision of the forest supervisor in making cruise sticks.)

GOALS

The student will develop a better understanding of the use of some forestry tools and activities performed by forester aides.

DIRECTIONS

Follow the directions very carefully, step-by-step, completing each step before continuing to the next step. If any problem arises, ask the forest supervisor for assistance.

MATERIALS

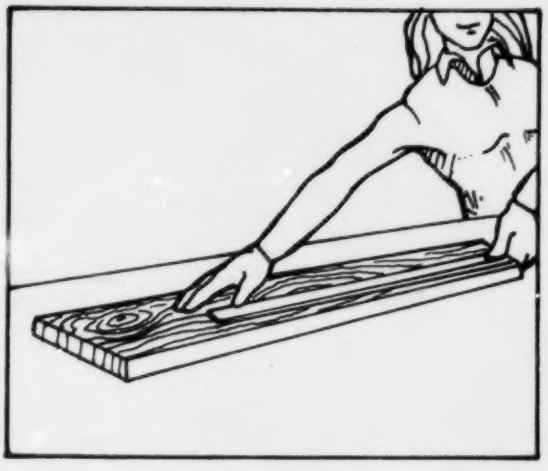
½" x 6" (1.27 x 15.24 cm) board
1 cruise stick
handsaw
pencil
hand engraver
combination square
6 ft. (1.83 m) rule
safety goggles
masking tape
sandpaper
paper

PROGRAMMED TEXT

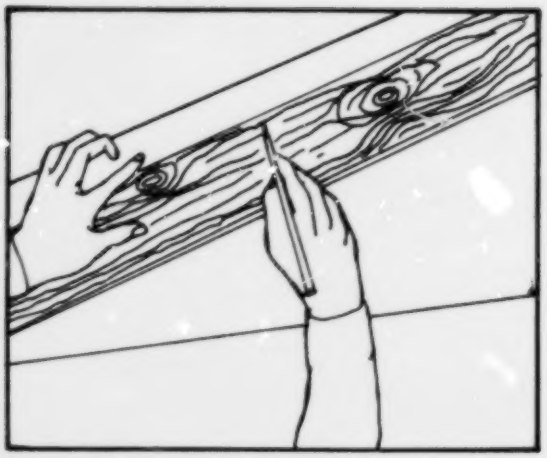
Instructional Objective 1

The student will cut out a Biltmore or cruise stick from the ½" x 6" board (1.27 x 15.24 cm).

STEP 1 – Obtain a ½" x 6" board (1.27 x 15.24 cm).

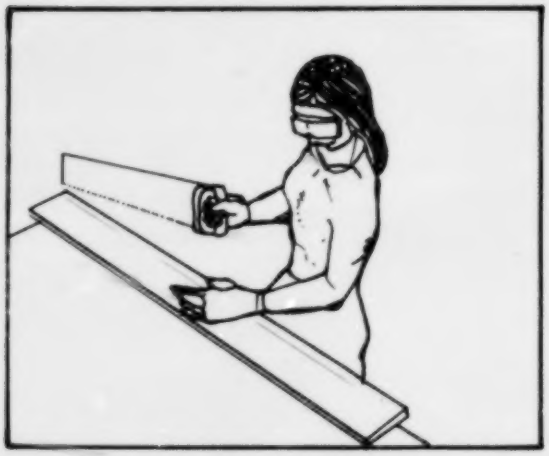


STEP 2 – Measure a stick 1¼" wide (3.17 cm) by 25" long (63.5 cm) on the board.

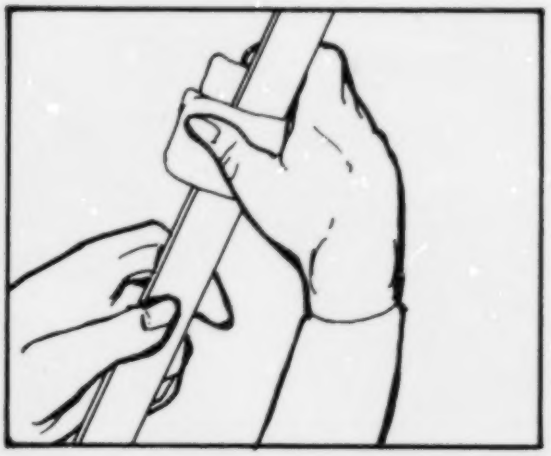


STEP 3 – Using a pencil, draw lines to be cut.

STEP 4 – Put on safety goggles.



STEP 5 – Using the handsaw, follow the pencil lines and cut out the stick.



STEP 6 – Sand the stick with sandpaper until smooth.

Check Point

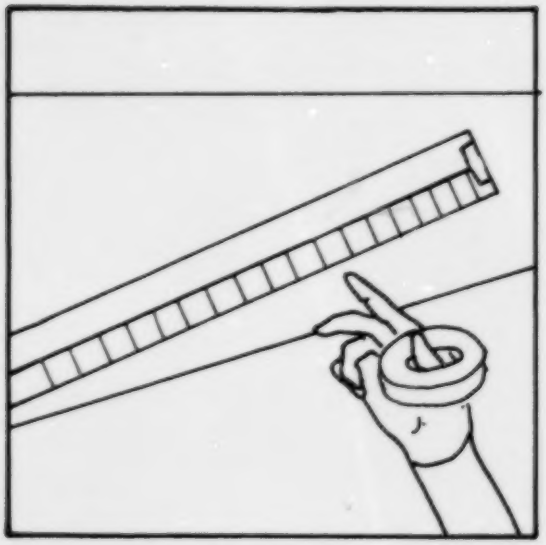
Before continuing to the next step, have the forest supervisor check the stick for proper size.

If the stick's measurements are okay, continue to the next step.

If the stick is not approved, determine the error and re-do the steps following directions.

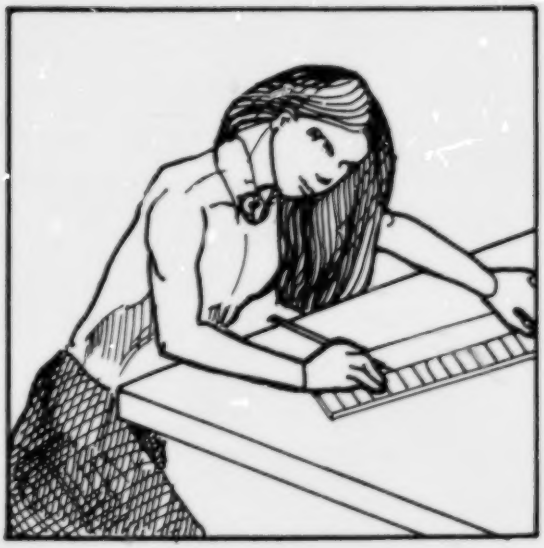
Instructional Objective II

The student will label the cruise stick.

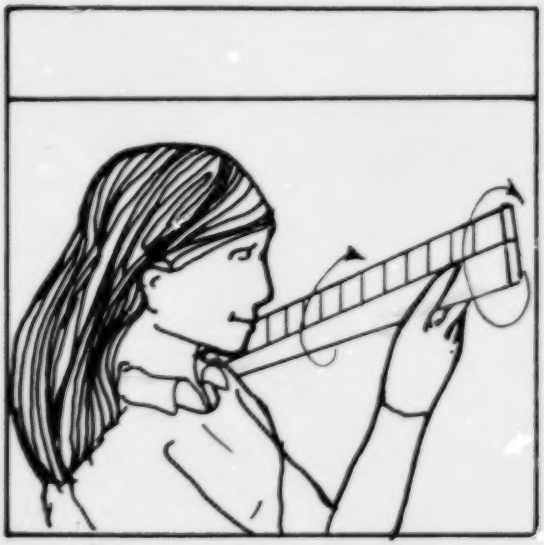


STEP 1 – Tape the cruise stick and the stick just cut together with masking tape, keeping the ends even.

STEP 2 – Using a pencil, mark the stick exactly as the cruise stick is marked.



STEP 3 – Label the marks as they are labeled on the cruise stick.



STEP 4 – Turn stick over and repeat the process.

Check Point

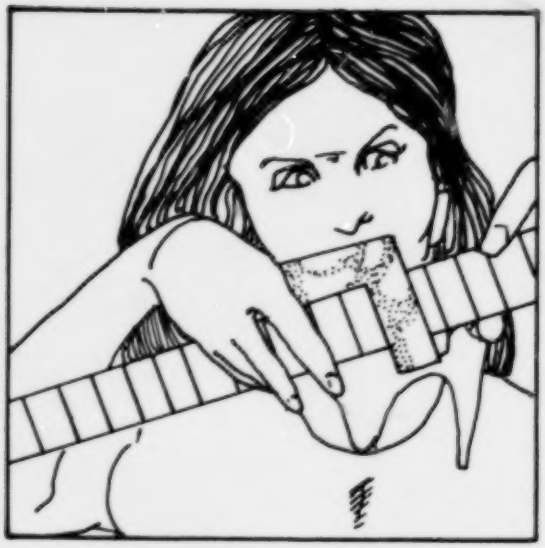
Before continuing to the next step, have the forest supervisor check the labeling and marks on the stick.

If the stick is approved, untape the sticks and continue to the next step.

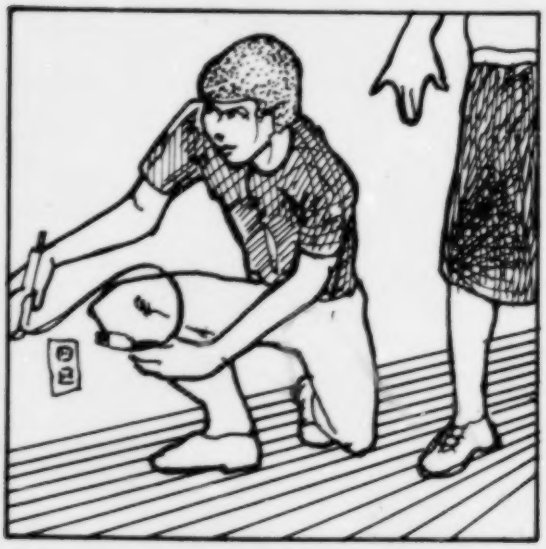
If the stick is not approved, determine the error; go back and follow directions.

Instructional Objective III

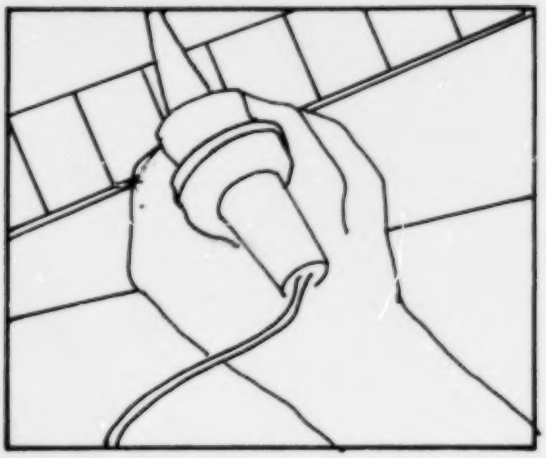
The student will engrave the marks into the stick.



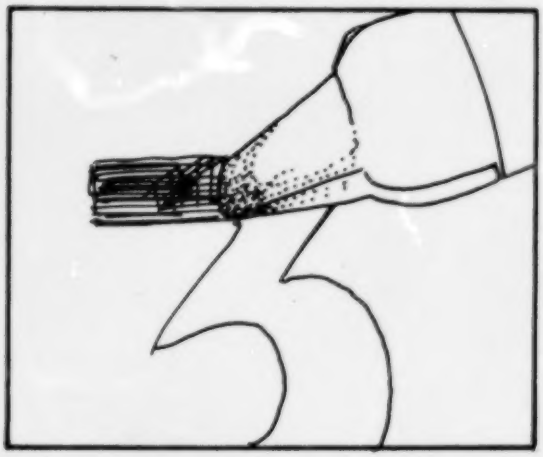
STEP 1 – Using the combination square, make sure all the marks are straight.



STEP 2 – Plug in the hand engraver.



STEP 3 – Carefully follow each line and engrave the mark into the wood.



STEP 4 – Using the engraver, trace over the labeled numbers.

Check Point

Before continuing to the next step, have the forest supervisor check the engraved stick.

If the stick is approved, continue to the next step.

If the stick is not approved, determine the error and re-do the steps following directions.

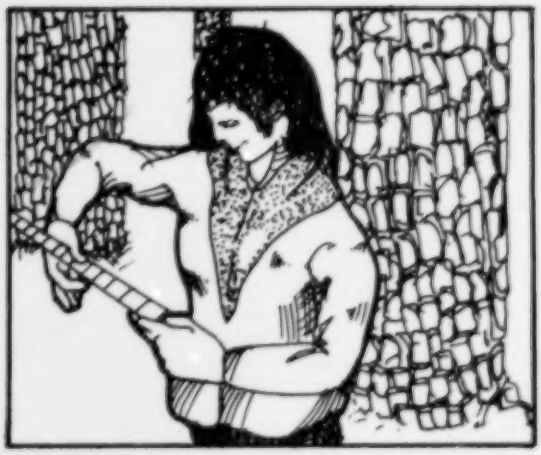
22

Instructional Objective IV

The student will use the new cruise stick to estimate diameters of the preselected trees.

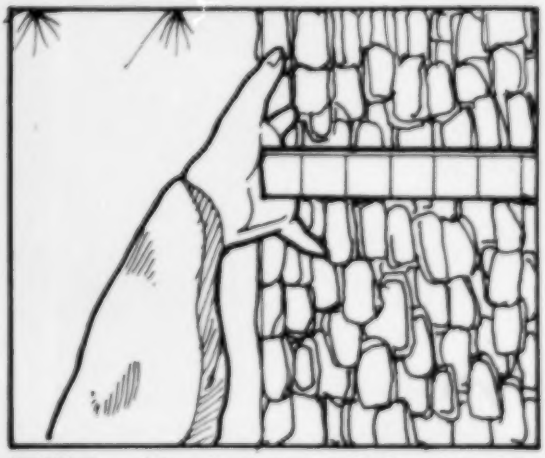
STEP 1 – Take pencil, paper, and new cruise stick and go to the site of trees to be measured.

STEP 2 – Number the paper 1, 2, 3 . . . depending on the number of trees.

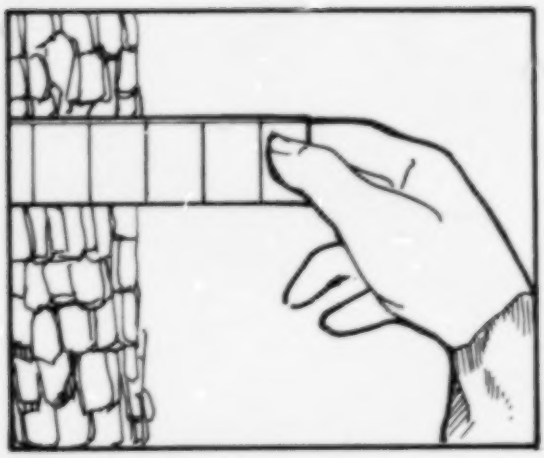


STEP 3 – Hold the stick so that you face the diameter side.

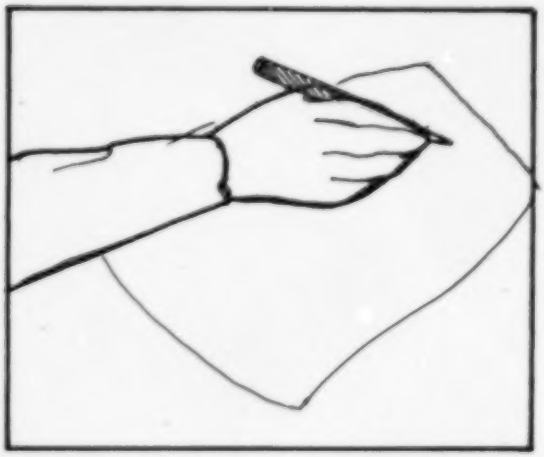
STEP 4 – Hold the stick at arm's length horizontally across the tree at breast height. (Distance between eye level and cruise stick must be 25 inches - 63.5 cm.)



STEP 5 – Align the left end of the stick with the left side of the tree.



STEP 6 – Without moving your head, read the diameter off the right side of the stick by noticing where right side of the tree and the stick meet.



STEP 7 – Record the diameter on the paper beside the tree number.

STEP 8 – Repeat this process for each tree.

Check Point

Before continuing to the next step, wait as the forest supervisor measures the trees with the steel tape at breast height to determine the diameter.

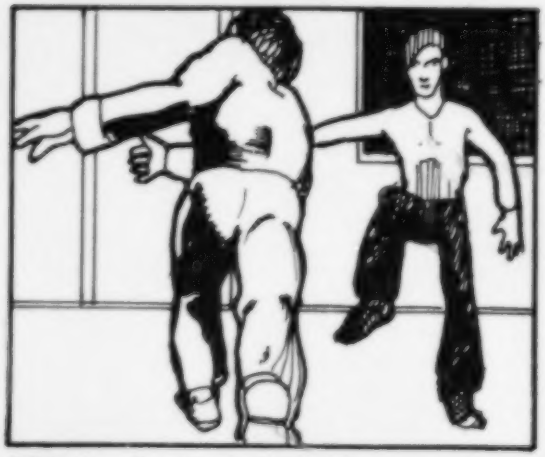
If your diameter measurements check, continue to the next step.

If the diameters do not check, go back and re-estimate the diameters following directions.

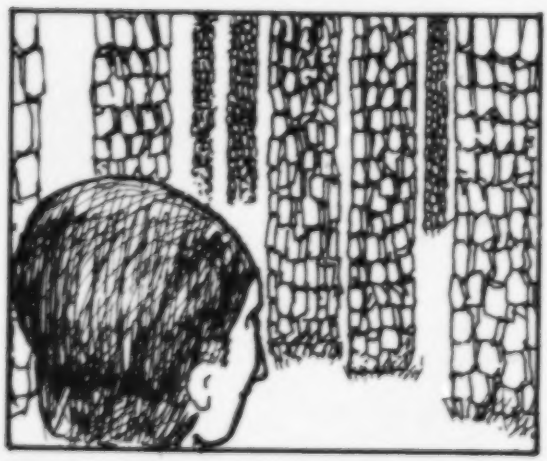
21

Instructional Objective V

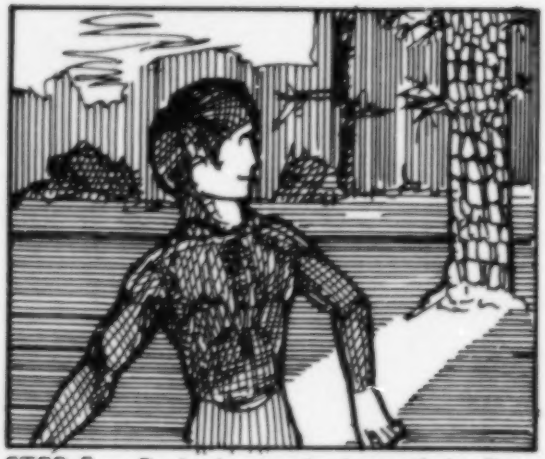
The student will use the new cruise stick to determine tree height.



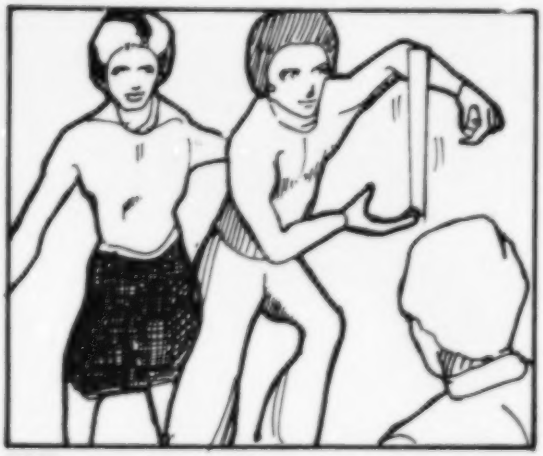
STEP 1 – Practice pacing on the premeasured site, trying to walk 1 yard (.91 m) per step.



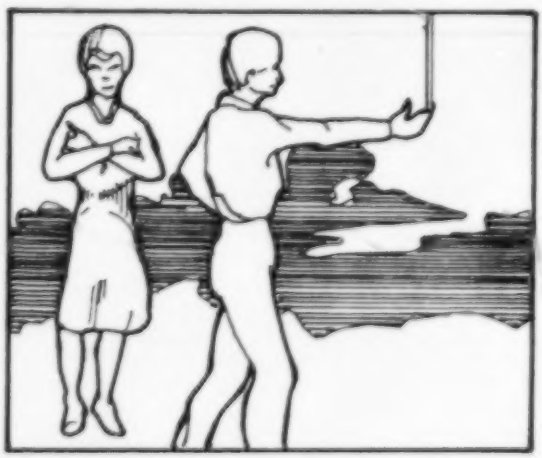
STEP 2 – Go to the site of the trees.



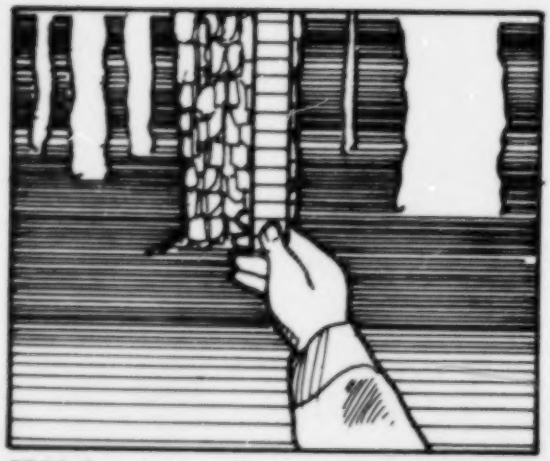
STEP 3 – Beginning at the base of the first tree, pace off 66 feet (20.12 m) or 22 yards (20.12 m) in a straight line away from the tree. Stay on the same level as the base of the tree if possible.



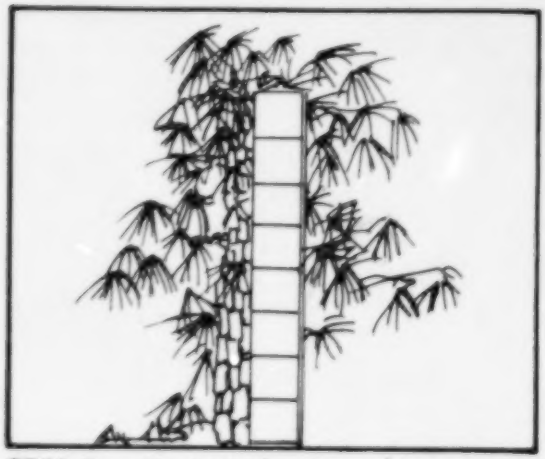
STEP 4 – Facing the tree, hold the cruise stick in a vertical position.



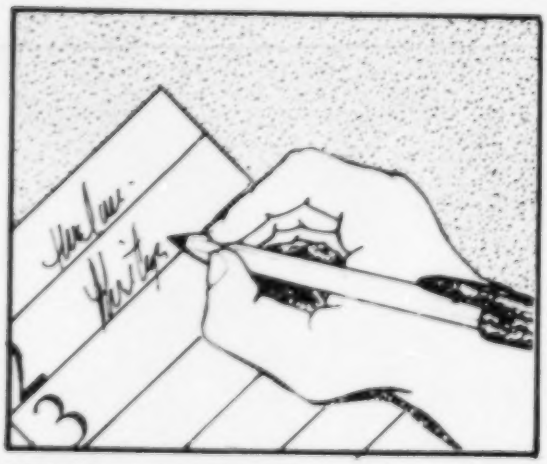
25 STEP 5 – Hold the stick at arm's length.



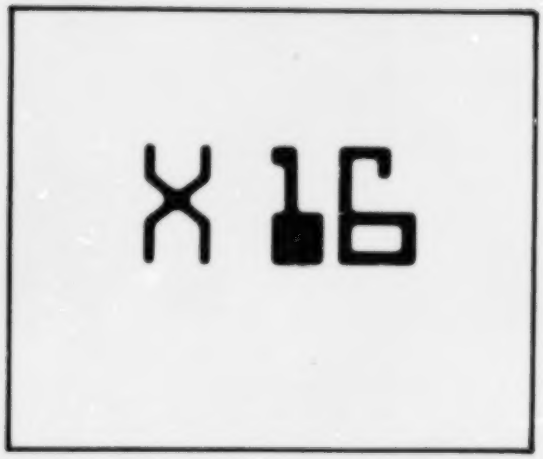
STEP 6 – Line up the lower end of the stick with the base of the tree.



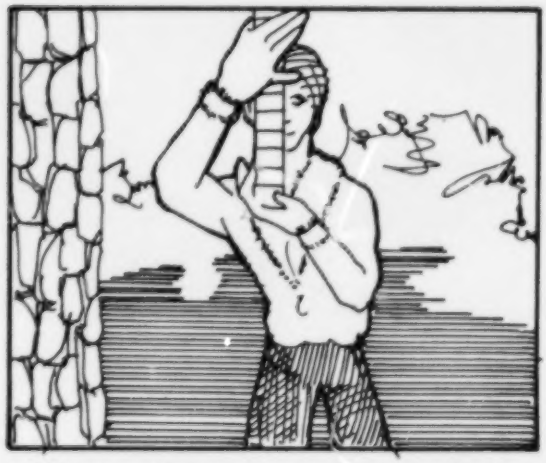
STEP 7 – Read the number of foot logs (a unit of measure used in forestry) from the upper end of the stick where it lines up with the upper end of the tree.



STEP 8 – Record this number beside the proper tree number on the paper.



STEP 9 – Multiply this number times 16. The answer will be the marketable height of the tree in feet.



STEP 10 – Repeat the process for each tree.

Check Point

Before continuing to the next step, check with the forest supervisor to see what his/her measurements were using the Abney level.

If the tree heights check, continue to the next step.

If the tree heights do not check, re-do objective following instructions.

451.137-010 FOREST NURSERY SUPERVISOR (forestry)

Supervises and coordinates activities of workers engaged in planting, cultivating, and harvesting seedling forest trees and grading, bundling, bailing, or otherwise packing trees for storage or shipment at forest nursery. Performs duties as described under SUPERVISOR (any ind.).

451.137-014 SUPERVISOR, CHRISTMAS-TREE FARM (forestry) crew boss.

Supervises and coordinates activities of workers engaged in planting, shearing, thinning, and harvesting Christmas trees on company-owned or leased land tracts: Tours land tracts to ascertain conditions and estimate work-hour requirements to plant, cultivate, or harvest trees. Confers with management to report conditions of lands and crops, recommend actions to be taken, and obtain instructions regarding variety and number of trees per acre to plant, cultural practices to apply, and harvesting date and location. Trains workers in planting, shearing, or harvesting trees. Performs duties as described under SUPERVISOR (any ind.).

451.687-010 CHRISTMAS-TREE FARM WORKER (forestry)

Plants, cultivates, and harvests evergreen trees on Christmas-tree farm: Removes brush, ferns, and other growth from planting area, using mattock and brush-hook. Plants seedlings, using mattock or dibble [TREE PLANTER (forestry)]. Scatters fertilizer pellets over planted areas by hand. Shears tops and limb tips from trees, using machete and pruning shears, to control growth, increase limb density, and improve shape. Selects trees for cutting according to markings or size, specie, and grade, and fells trees, using ax or chainsaw. Drags cut trees from cutting area, and loads trees onto trucks. May be designated according to seasonal task performed.

451.687-018 SEEDLING PULLER (forestry) tree puller.

Harvests tree seedlings in forest nursery: Walks along seedling tree rows, stoops, and pulls clumps of seedlings from loosened soil. Knocks clumps together to dislodge soil and loosen roots, and places seedlings in field trays.

451.687-022 SEEDLING SORTER (forestry) tree sorter.

Sorts tree seedlings in forest nursery: Removes seedlings from field trays, separates them, and compares root formation, stem development, and foliage condition with standards chart and verbal instructions. Discards sub-standard seedlings and places remainder on conveyor for bailing.

452.364-010 FORESTER AIDE (forestry) forest technician.

Compiles data pertaining to size, content, condition, and other characteristics of forest tracts, under direction of FORESTER (profess. & kin.); and leads workers in forest propagation, fire prevention and suppression, and facilities maintenance: Traverses forest in designated pattern to gather basic forest data such as topographical features, species and population of trees, wood units available for harvest, disease and insect damage, tree seedling mortality, and conditions constituting fire danger. Marks trees of specified specie, condition, and size for thinning or logging. Collects and records data from instruments, such as rain gage, thermometer, stream-flow recorder, and soil moisture gage. Holds stadia rod, clears survey line, measures distances, records survey data, and performs related duties to assist in surveying property lines, timber sale boundaries, and road recreation sites. Trains and leads conservation workers in seasonal activities, such as planting tree seedlings, collecting seed-cones, suppressing fires, cleaning and maintaining recreational facilities, and clearing fire breaks and access roads. Gives instructions to visitors of forest, and enforces camping, vehicle use, fire building, sanitation, and other forest regulations.

452.367-014 FIRE RANGER (forestry)

Patrols assigned area of forest to locate and report fires and hazardous conditions and to insure compliance with fire regulations by travelers and campers: Hikes or drives to vista points to scan for fires and unusual or dangerous conditions. Reports findings and receives and relays emergency calls, using telephone or two-way radio. Visits camping sites to inspect activities of campers and insure compliance with forest use and fire regulations. Gives instructions regarding sanitation, fire, and related forest regulations. Extinguishes smaller fires with portable extinguisher, shovel, and ax. Serves as crew leader for larger fires. Renders assistance or first aid to lost or injured persons. Participates in search for lost travelers or campers.

452.687-010 FOREST WORKER (forestry)

Perfroms variety of tasks to reforest and protect timber tracts and maintain forest facilities, such as roads and campsites: Plants tree seedlings in specified pattern, using mattock, planting hoe, or dibble. Cuts out diseased, weak, or undesirable trees, and prunes limbs of young trees to deter knot growth, using handsaw, powersaw, and pruning tools. Fells trees, clears brush from fire breaks, and extinguishes flames and embers to suppress forest fires, using chainsaw, shovel, and engine-driven or hand pumps. Clears and piles brush, limbs, and other debris from roadsides, fire trails, and camping areas, using ax, mattock, or brush hook. Sprays or injects trees, brush, and weeds with herbicides, using hand or powered sprayers or tree injector tool. Erects signs and fences, using posthole digger, shovel, tamper, or other handtools. Replenishes firewood and other supplies, and cleans kitchens, restrooms, and campsites or recreational facilities. Holds measuring tape or survey rod, carries and sets stakes, clears brush from sighting line, and performs related tasks to assist forest survey crew.

452.687-018 TREE PLANTER (forestry)

Plants seedling trees to reforest timber lands or Christmas tree farms: Digs planting hole at predetermined spaced interval, using mattock-like tool or dibble. Places seedling in hole and packs soil around plant, using foot or planting tool.